Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

JUN 18 2002

Docket No. 50-336
B18672

RE: 10 CFR 50.73(a)(2)(IV)(A)

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Nuclear Power Station, Unit No. 2
Licensee Event Report 2002-002-00
Reactor Trip Due to Turbine Trip

This letter forwards Licensee Event Report (LER) 2002-002-00, documenting an event that occurred at Millstone Nuclear Power Station, Unit No. 2 on April 19, 2002. This LER is being submitted pursuant to 10 CFR 50(a)(2)(IV)(A).

There are no regulatory commitments contained within this letter.

Should you have any questions regarding this submittal, please contact Mr. David W. Dodson at (860) 447-1791, extension 2346.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.

C. J. Schwarz, Director
Nuclear Station Operations and Maintenance

Attachment (1): LER 2002-002-00

cc: H. J. Miller, Region 1 Administrator
R. B. Ennis, NRC Senior Project Manager, Millstone Unit No. 2
NRC Senior Resident Inspector, Millstone Unit No. 2

IE22

Docket No. 50-336
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Attachment 1

Millstone Nuclear Power Station, Unit No. 2

LER 2002-002-00

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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TITLE (4)

Reactor Trip Due to Turbine Trip

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
04	19	2002	2002	- 002 -	00	06	18	2002	FACILITY NAME	DOCKET NUMBER 05000

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)			
OPERATING MODE (9)	1	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
POWER LEVEL (10)	99.5	20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
		20.2203(a)(1)	50.36(c)(1)(i)(A)	X 50.73(a)(2)(iv)(A)	73.71(a)(4)
		20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
		20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER
		20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	Specify in Abstract below or
		20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	in NRC Form 366A
		20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
		20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
		20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
David W. Dodson, Supervisor-Licensing	860-447-1791

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
☐ YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)(16)

On April 19, 2002, with the plant operating at approximately 99.5 percent power, a turbine trip resulted in an automatic reactor trip when a temperature switch in the Stator Water Cooling System tripped on a high value. The temperature switch in the Stator Water Cooling System was found with a trip setpoint value approximately 14°C lower than the acceptance criteria found in the calibration procedure.

Following the reactor trip, main steam reheat valves, 2-MS-2A and 2-MS-2B, did not close as expected and had to be manually closed, resulting in an unexpected RCS cooldown. Auxiliary Feedwater automatically initiated to compensate for a low level in the Steam Generators caused by shrinkage. Required safety equipment functioned as expected and this event is considered to be of low safety significance.

The cause of this event is indeterminate. The presumptive causes are either an equipment failure or insufficient oversight and controls that led to calibration errors.

Following the reactor trip, the temperature switch was tested and re-calibrated to the proper setpoints prior to plant restart. To prevent recurrence the stator coolant temperature switch from both Millstone Unit Nos. 2 and 3 will be replaced. The Unit No. 2 device will then be sent to the vendor for a failure analysis. In addition, separate procedures will be developed for secondary plant instruments that are trip sensitive at Unit Nos. 2 and 3.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

1. Event Description

On April 19, 2002, with the plant operating at approximately 99.5 percent power, a turbine [TRB] trip resulted in an automatic reactor [RCT] trip when a temperature switch [TS] in the Stator Water Cooling System tripped on a high value. The temperature switch in the Stator Water Cooling System was found with a trip setpoint value approximately 14 degrees Celsius (°C) lower than the acceptance criteria found in the calibration procedure.

This incorrect trip setpoint was just above the normal system temperature, so that on April 19, 2002, an increase in the stator water cooling temperature tripped temperature switch 63T-72. The increase in temperature of the stator cooling water was primarily due to the increase in generator power that was occurring at the time of the trip. Additionally, to a lesser extent, the increase in stator cooling water temperature was affected by an increase in the circulating water inlet temperature. This increase in inlet temperature was caused by an environmental condition that allows hot water from the plant discharge point to sweep back to the intake structure. The increase in water temperature at the intake structure [NN] affected the Service Water system directly, and the Turbine Building Closed Cooling Water system [KB] indirectly.

The purpose of the Stator Water Cooling System is to remove heat in the main generator [GEN] stator produced during the electrical generation process, and supply cooling water to the static rectifiers [RECT] used in the excitation system. It also functions to purify the cooling system, maintaining a very low level of electrical conductivity.

In March , 2002, during refueling outage 14, the stator water outlet temperature switch was calibrated and found to have a setpoint of 80.4°C, within the accepted range of 80-82°C. The reset point was recorded as 50.2°C. There is no acceptance criteria given for the reset point, so it was left as found. Following the plant trip on April 19, 2002, the temperature sensor was checked and found to have a setpoint of 66°C with a reset value of 60.1°C. The sensor was re-calibrated to an acceptable setpoint of 82°C with a reset value of 79.4°C and the plant was re-started the following day.

The cause of the incorrect setpoints has not been determined. Following the plant trip, repeated checks of the calibration, both as-found and as-left were completed. The calibration checks were completed using both a dry-method and a water bath. Both methods gave similar results. No indication of equipment failure could be identified and the plant was restarted the following day using the same sensor.

Possible failure modes were investigated. Vibration has been a concern on the stator water cooling skid with respect to pump/motor reliability, and steps have been taken in the past to help reduce these vibrations. Most recently, during the last refueling outage, epoxy was injected under the pump [P] baseplate to dampen resonant frequencies. In the past, vibration has not had the type of impact on the setpoints that were experienced in this event, and discussions with the vendor indicate that setpoint drift of this magnitude is possible, however highly unlikely. The vendor would have to do a thorough inspection of the switch to determine whether vibration caused this magnitude of setpoint drift.

Another possibility for equipment failure is that the six foot long capillary tube that connects the temperature sensing bulb to the bourdon tube is not routed in conduit [CND]. Because it is exposed, there is a possibility that the capillary tube could come into contact with a nearby hot pipe and therefore have an adverse effect on the sensor readings. However, the capillary tube has historically not been affected in such a manner to cause a trip signal. Therefore, no plausible equipment failure scenarios could be identified that would produce a turbine trip signal.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

Although no credible failure mechanism for the temperature switch could be determined, the very lack of any conclusive evidence forces a consideration to be made that some undiscovered failure of the temperature switch may have been the cause of the low setpoint.

Additionally, the event may have been a result of a human error in calibrating the temperature sensor. The Stator Winding Cooling Water System Calibration procedure covers the calibration of 23 instruments in this system. Only one of the instruments covered by this procedure generates a trip signal for the turbine, the stator cooling outlet temperature. There is no caution statement and only a small notification in the procedure to alert the user to the trip potential of the instrument. The other trip signal in the system, the low system pressure sensor, is calibrated using a separate procedure, Stator Cooling System Setup.

The Stator Winding Cooling Water System Calibration procedure provides minimal guidance for performing the calibration. It provides no guidance on key points such as the value of the reset setpoint, the size chuck to use in the King Nutronics dry method calibration unit, or the rate at which the temperature is to be increased or decreased during the calibration. While this information is considered skill of the craft within the Instrumentation and Control department, the technicians vary widely in their interpretations of the values that should be used.

Testing using the King Nutronics calibration unit along with a temperature switch similar to the one installed in the stator cooling system was performed to test calibration techniques. The testing was performed using different combinations of common errors experienced during calibration of a temperature sensor including incorrect aluminum chuck sizes on the calibration unit, and different heatup and cooldown rates. The testing proved that incorrect setpoint and reset values matching those found on the switch following the reactor trip, could be obtained.

This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv) as an event that resulted in an automatic reactor scram.

2. Cause

The cause of this event is indeterminate. The presumptive causes are either an equipment failure or insufficient controls that led to calibration errors.

3. Assessment of Safety Consequences

The purpose of the Stator Water Cooling System is to remove heat in the main generator stator produced during the electrical generation process, and supply cooling water to the static rectifiers used in the excitation system. It also functions to purify the cooling system, maintaining a very low level of electrical conductivity.

Following the reactor trip, main steam reheat valves, 2-MS-2A and 2-MS-2B, did not close as expected and had to be manually closed, resulting in an unexpected RCS cooldown. Auxiliary Feedwater [BA] automatically initiated to compensate for a low level in the Steam Generators [SG] caused by shrinkage. Required safety equipment functioned as expected and this event is considered to be of low safety significance.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

4. Corrective Action

Following the reactor trip, the temperature switch was tested and re-calibrated to the proper setpoints prior to plant restart. To prevent recurrence the stator coolant temperature switch from both Millstone Unit Nos. 2 and 3 will be replaced. The Unit No. 2 device will then be sent to the vendor for a failure analysis. In addition, separate procedures will be developed for secondary plant instruments that are trip sensitive at Unit Nos. 2 and 3. Additional corrective actions are being addressed in accordance with the Millstone Corrective Action Program.

5. Previous Occurrences

None

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].